AbstractID: 2096 Title: Use of a Commercially-Available Bio-Feedback Device in Respiratory Correlated Radiation Therapy (RCRT)

Introduction. An ideal respiratory pattern acquired by monitoring the 2D motion of a fiducial marker would represent a cyclic monotone. This may be achieved by providing patients with properly devised feedback and coaching. Use of a commercially-available device approved for treatment of hypertension improves motion tracking, and therefore improves the efficacy of marker-motion based RCRT.

Methods: The Resp$e$Rate^{TM} (Intercure, Inc) device uses a motion sensor to sense respiratory motion, and aural tones to cue the user to inhale and exhale. The cues are adjusted to prolong expiration time, so long as the user is compliant, until a steady state is achieved. The RPM (Varian Inc.) infrared reflector-based system was used to monitor the respiratory motion of healthy volunteers prior to, and during the use of the Resp$e$Rate device. During each session, marker motion was recorded as a function of time. Power spectrum frequency analyses were performed on recorded data. The effects of using the training device were evaluated in terms of short and long-term change in frequency histogram, time to effect, and qualitatively, pattern changes observed in amplitude.

Results: In all cases, a significant reduction in 50% and 80% bandwidth and most prominent frequency was obtained. This change was less noticeable during the first 5 minutes of each session than in minutes 6 through 12. Respiratory conditions approaching a steady state were achieved after the second training session.

Conclusion: Use a biofeedback device, such as the Resp$e$Rate device, significantly stabilizes frequency characteristics of respiratory motion, potentially permitting more efficacious RCRT.